

# CLOUD COMPUTING AND SECURITY OF INFORMATION ASSETS

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## Abstract

This paper deals with cloud computing technology and the protection of information assets in the company. The tools and system for safety management of information assets is presented in the paper. The system design contains a detailed methodology. The use of this methodology will enable effective decision making.

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**Keywords:** Assets, cloud computing, security and threat.

## Introduction

Many organizations and commercial companies do not know their assets and do not know they are the most valuable asset you own. Assets have huge value for organization or company.

Security and protection of information assets can be divided into two basic groups:

- Protection against damage or loss due to natural disaster, equipment failure or human error. The goal is not alienate or destroy data.
- Protection against damage or loss inside in the Company's operations. Deliberately damage HW or SW, illegally obtain, degrade or alter the information is the aim.

Information security management system (ISMS) deals with access to information security management. ISMS is a summary of the measures, policies, rules, uses standards and others.

Companies take decisions on the use of cloud computing technologies more and more often nowadays. Unfortunately, companies do not know the risks and opportunities of this technology.

## Technology of Cloud Computing

Cloud computing layer separates servers from applications using visualization. The technology provides methods and means for centralizing services from data centers.

Cloud computing tools allow you to manage a data center efficiently. Data centers provide effective services to users of information systems.

Cloud computing involves a large group of technology solutions and opens up many problems. This includes operational reliability and also concerns the security of data which are stored in the public data center.

Cloud computing is moving slowly into the private data center. Suppliers of information systems operate these data centers.

Cloud computing offers three levels which are layered on each other.

Levels:

- Virtualization of infrastructure
- Virtualization of platforms
- Virtualization of services

Virtualization infrastructure builds a farm which consists of servers, disk array, network infrastructure and management tools for cloud computing. Suppliers of information systems implement virtual servers from ready-made templates in these virtual data centers.

Virtualization platform allows the unification of information systems. This allows reducing the cost of running the data center. Suppliers of information systems use a virtual application and database servers. Virtualization platform is advantageous for the implementation of all applications. The requirements of information systems can be reduced significantly. Qualified administrators managing platform can be shared.

Virtualization of services is the goal of technology Cloud Computing. Visualization services in private cloud computing is used mainly for large organizations. The parent organizations operate information systems of subordinated organizational units in its data center.

### **Category of Cloud Computing**

Cloud computing can be divided by the type of service:

- SaaS - Software as a Service. An application (use of software) is a service. The service is available in the internet. It's like hosting software.
- PaaS - Platform as a Service. The platform is the service. Customer will use the provider's complete development environment and at the same time he creates and runs own applications in this environment.
- IaaS - Infrastructure as a Service. Infrastructure is the service. Customer rents for himself hardware and infrastructure. The customer uses a custom application in this case.

Cloud computing can be divided by the type of cloud:

- Public cloud. The supplier provides all services. The client does not have its own extensive capacity of ICT and software licenses.
- Private Cloud. The company is the operator of the cloud. It's the owner ICT and software. The Company uses the system in its entirety. The system is accessible only within the company. Only authorized persons can benefit cloud.

### **Cloud Computing and Gartner**

Julian Arias Beltran features in [5] company Gartner. Gartner is the world's leading IT research and advisory company. They guide thousands of organizations in the right direction with insights into the technological world. One of the famous tools invented by Gartner is the Hype Cycle.

The Hype Cycle was introduced in 1995, and is used to show the interest or "hype" and resulting disappointment which usually happen after the introduction of a new technology.

The purpose of the Hype cycles is to show how and when technologies move beyond the "hype", which is used by companies to see whether certain technologies are worth investing in and if it's ready for adoption within the business.

One example of this can be seen with cloud and Big Data. Although many companies have started to embrace the cloud, many companies, particularly small to medium sized business were holding back because of concerns. Security, privacy and legality were the main concerns for organizations moving to cloud (and still is a concern for several businesses). But now that the "Hype" is on the up slope of the Hype Cycle, these concerns are fading away while more and more businesses jump on the cloud bandwagon.

Gartner Hype Cycle is a graphic representation of the maturity, adoption and social application of specific technologies. There are five phases in the Hype cycle:

- **Technology Trigger:** the first phase is the breakthrough or product launch which causes significant press and interest.
- **Peak of Inflated Expectations:** the next phase is the publicity which generates 'hype' or further interest.
- **Trough of Disillusionment:** This phase is when the technology fails to meet expectations and can quickly become unfashionable. Because of this, the press would usually abandon the topic.
- **Slope of Enlightenment:** In this section, you start to see that some businesses continue to use the technology and discover further benefits and practical applications.
- **Plateau of Productivity:** Once the technology reaches this final phase, the benefits of it become widely demonstrated and accepted. It becomes more stable and continues to adapt with more generations.

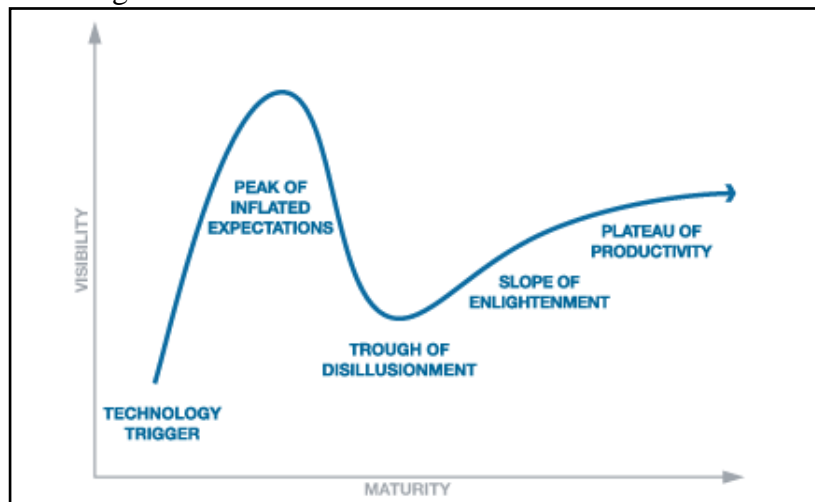


Figure 1: Gartner's Hype Cycle, source (Gartner)

These Gartner's Hype Cycles significantly ease making of the decision. Cloud computing technology will be easy to use in the company.

### Gartner's Hype Cycle for the Cloud Computing

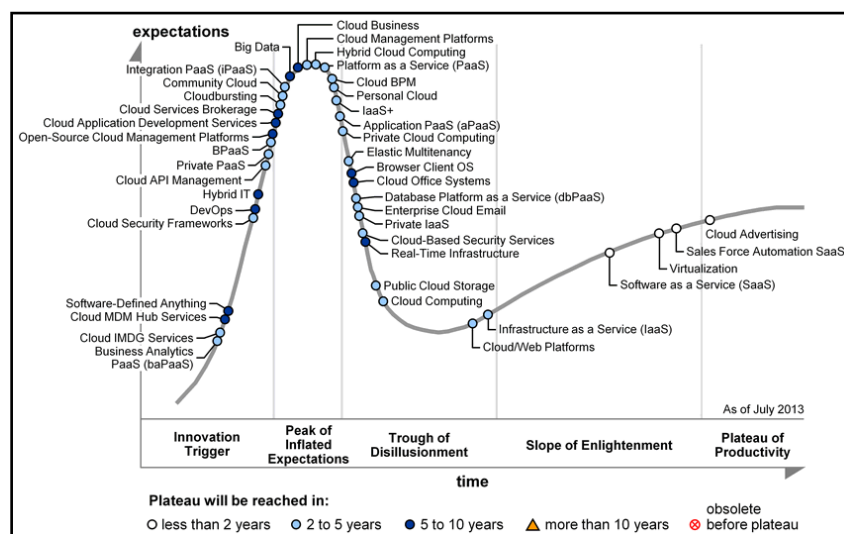


Figure 2: Hype Cycle for Cloud computing 2013, source (Gartner)

Cloud Advertising, Sales Force Automation SaaS, Virtualization and SaaS are practical applications and become more stable and continues to adapt with more generations for companies.

### Gartner's Hype Cycle for the Cloud Security

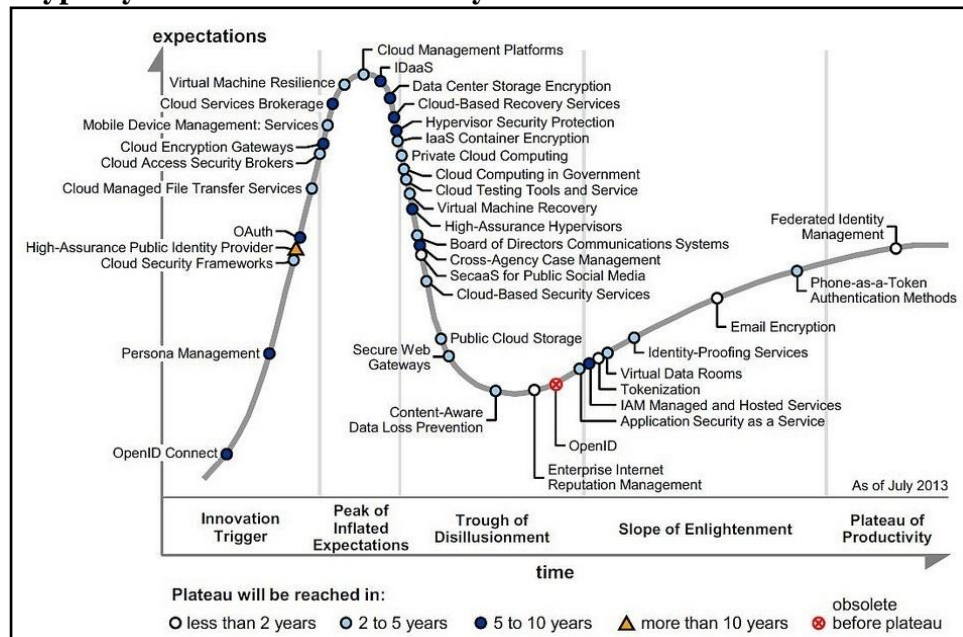


Figure 3: Gartner's Hype Cycle for Cloud Security 2013, source (Gartner)

This Hype Cycle encompasses technologies and standards that improve the security and reliability of the cloud computing model, and trusted application and security services that are delivered by cloud services providers.

### Gartner Hype Cycle Forecasts

Julian Arias Beltran features in [5] the latest forecasts of the Hype Cycle show that there will be quick adaptation for SaaS (Software as a Service). Gartner predicts that more than 50% of companies will use SaaS applications by 2015. It is also predicted that cloud email is will be used by 10% of organizations, which was a surprising drop since previous hype cycle forecasts, which were close to 20%.

The factors driving the SaaS adoption is the overcoming of IT and budget limitations and the increase in 'big data'. Big data will have a strong impact within organizations in 2-5 years.

Markets of cloud management business processes are expected to increase annually by 25%. There has been an increase in the interest of cloud solutions for MDM (Master Data Management). The solutions involve the following leading suppliers: Cognizant, Data Scout, IBM, Informatica, Oracle and Orchestra Network.

One of the most notable forecasts is that by 2014, personal cloud is expected to replace the PC as the main data management for a user's digital life. And an impressive 75% of enterprises surveyed by Gartner are planning to move to cloud computing by 2014.

### Draft Control System of Safety Information Assets

Design of system security management of information assets is presented below. The proposal involves the use of cloud computing technologies. It comprises:

- Identification and evaluation of information assets.
- Identification of threats.

- Calculation of a risk assessment.

Implementation and maintenance of an information security management will not be carried out by one person but a group of people. This team of people will be selected from various levels of management. The team will work together. The team is divided into sub-teams with close ties by subsystem information security management.

### Identification and Evaluation of Information Assets

Unique identification of information assets of the company is the first step to ensure the protection of information. For each information asset it will be determined by the owner. The owner is responsible for the asset.

Evaluation of assets will be done after the identification of assets. Assets will be valued according to their importance and value.

Assets may lose confidentiality, integrity or availability.

### Identification of Threats

Identification of the threats will be carried out after identifying assets and their owners. The threat may cause adverse event. Existence of the company may be at risk depending on the size of the impact of the incident.

### Calculation of Risk Assessment

Risk assessment methods can be divided into two groups based on quantitative and qualitative methods. Qualitative risk assessment is verbal explanation. What is the importance of risk assessment "high risk" or "average risk" for the company? The significance is minimal. For this reason there are quantitative methods preferable. This means that the risk is expressed in the form of numbers.

Calculation of risk assessment is performed for each asset. The consequences and impact of the incident on the assets will be assessed in terms of loss of confidentiality, integrity and availability. The ability to obtain intact information assets back is important.

Assessing impact, probability of occurrence and probability of disclosure is the most important stage. Categories will be determined by points as follows:

I - impact	score
barely perceptible	1
meaningless	2÷3
moderately significant	4÷6
serious	7÷8
extremely serious	9÷10

Figure 4: Impact, source (author)

O - occurrence	score
unlikely	1
very small	2÷3
small	4÷6
mild	7÷8
high	9÷10

Figure 5: Occurrence, source (author)

D - disclosure	score
high	1
mild	2÷5
small	6÷8
very small	9
unlikely	10

Figure 6: Disclosure, source (author)

Risk Priority Number (RPN) is a crucial indicator of the risk assessment. RPN is a multiple of impact, occurrence and disclosure.

The following applies:  $RPN = I \cdot O \cdot D$

RPN takes a value in the range  $1 \div 1000$ . The severity of risk determines the size of RPN. **The high value of the RPN has a great importance of risk.**

The company management will determine the acceptable level of risk for each asset. Unfortunately all risks can't be eliminated.

Risks with high RPN is necessary to eliminate or reduce to an acceptable level. The company management will propose and implement measures to manage those risks.

I recommend use this table for evaluation.

Calculation of a risk assessment					
Asset:					
Risk	Current status				Comment
	Impact	Occurrence	Disclosure	RPN	
1				0	
2				0	
3				0	
4				0	

Figure 7: Table for evaluation, source (author)

Information assets are the most valuable for organizations and commercial companies. Information are vital to the decisions and actions in the management process. Information have to be complete, timely delivery, updated, accessible and economically obtainable.

## Conclusion

Cloud computing is on the top of a wave of interest today. Nobody asks why to use it. Everyone is asking how to use it. Figure 8 shows high growth of cloud infrastructure services.

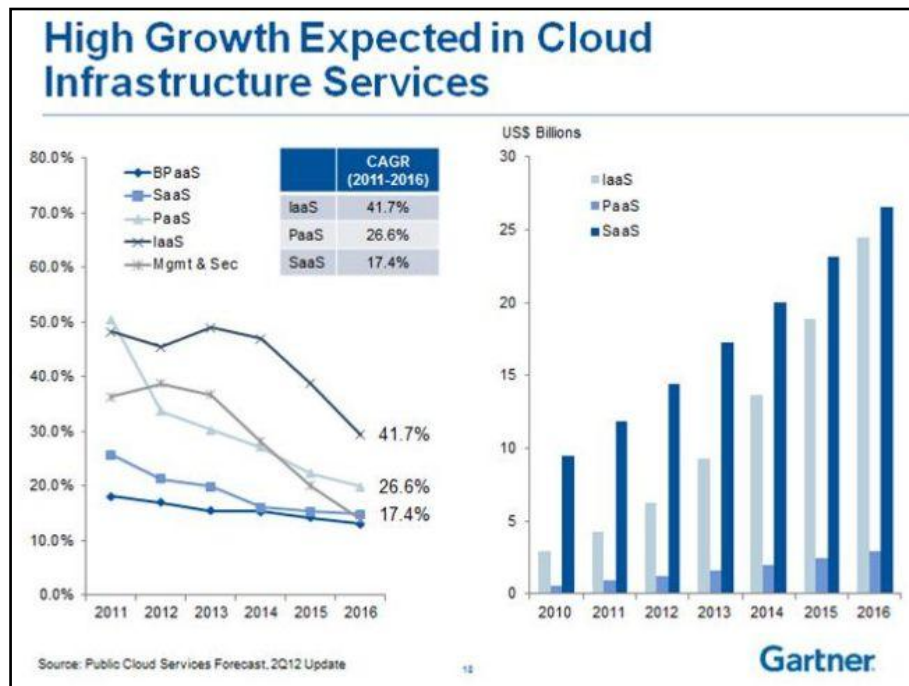


Figure 8: High growth of cloud infrastructure services, source (Gartner)

## Abbreviations

HW	- Hardware
IaaS	- Infrastructure as a Service
ICT	- Information and Communication Technologies
ISMS	- Information security management system
PaaS	- Platform as Service
RPN	- Risk Priority Number
SaaS	- Software as Service
SW	- Software

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